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AUTHOR	Sugimoto, Shigeo; Adachi, Jun; Baker, Thomas; Weibel, Stuart
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ABSTRACT

This paper describes the International Conference on Dublin Core and Metadata Applications 2001 (DC-2001), the ninth major workshop of the Dublin Core Metadata Initiative (DCMI), which was held in Tokyo in October 2001. DC-2001 was a week-long event that included both a workshop and a conference. In the tradition of previous events, the workshop provided a forum for developers of Dublin Core to discuss important issues face-to-face. The conference part included both tutorials and presentations of peer-reviewed papers. The paper also describes follow-up activities since DC-2001 by working groups and the DCMI Usage Board. These activities are put into the context of DCMI's recent reorganization. An appendix includes the Table of Contents from Proceedings of DC-2001. Includes two tables. (Contains 10 references.) (Author)

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Report from International Conference on Dublin Core and Metadata Applications 2001

Shigeo SUGIMOTO
University of Library and Information Science, Japan

Jun ADACHI
National Institute of Informatics, Japan

Thomas BAKER
Birlinghoven Library, Fraunhofer-Gesellschaft, Germany

Stuart WEIBEL
Dublin Core Metadata Initiative, USA

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Abstract:

This paper describes the International Conference on Dublin Core and Metadata Applications 2001 (DC-2001), the ninth major workshop of the Dublin Core Metadata Initiative (DCMI), which was held in Tokyo in October 2001. DC-2001 was a week-long event that included both a workshop and a conference. In the tradition of previous events, the workshop provided a forum for developers of Dublin Core to discuss important issues face-to-face. The conference part included both tutorials and presentations of peer-reviewed papers. The paper also describes follow-up activities since DC-2001 by working groups and the DCMI Usage Board. These activities are put into the context of DCMI's recent reorganization.

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1. Introduction

Since the first metadata workshop in Dublin (Ohio) in 1995, a series of nine workshops has provided the developmental focus for the Dublin Core Metadata Initiative (DCMI)[1]. These workshops have provided the primary opportunities for the Dublin Core community to meet face-to-face, exchange ideas, build consensus, and develop an ongoing workplan. At the Seventh Dublin Core workshop in Frankfurt in October 1999 (DC-7), DCMI recognized a need for a broader audience of researchers and implementers to present new metadata technologies and report on deployment experience. Consequently, DC-8 in Ottawa in October 2000 provided a platform for peer-reviewed implementation reports and poster presentations. On the basis of this experience, DCMI extended the scope of the workshop series beyond that of DCMI working-group meetings to include introductory tutorials and conference papers on issues broadly related to metadata on the Web.

DC-9, held at the National Center of Sciences in Tokyo in October 2001, was both the first workshop cast as a full conference on metadata and the first event in the DCMI series to be held in Asia [2]. Re-named the International Conference on Dublin Core and Metadata Applications 2001 (DC-2001), the conference attracted 300 participants from nearly thirty countries of Asia-Pacific, Europe, and North America. Many attendees new to the DCMI context came from within Japan and from other Asian countries.

2. International Conference on Dublin Core and Metadata Applications 2001 (DC-2001)

2.1 Overview of DC-2001

The conference was hosted by the National Institute of Informatics (NII), formerly called NACSIS, which is both the information hub for the Japanese academic libraries and a central government-sponsored research center for information and computer science. NII was chosen as the primary host both because of their participation in previous Dublin Core workshops and because of their excellent location and conference facilities. Jun Adachi of NII served as General Chair of the conference. From the early stages of preparation, NII worked jointly with the co-sponsors: the National Diet Library (NDL), Japan Science and Technology Corporation (JST), Communications Research Laboratory (CRL), the University of Library and Information Science (ULIS), and DCMI.

Not limiting itself to Dublin Core, DC-2001 targeted a broader metadata community. The workshop and conference programs were each given the equivalent of two full days. The workshop event, organized by Makx Dekkers, Managing Director of DCMI, was planned as a smaller workshop, on the model of previous DCMI workshops, with working-group and administrative meetings. The conference event, co-chaired by Shigeo Sugimoto and Thomas Baker, included a full conference with a tutorial track, poster presentations, and paper sessions. There were several invited sessions on topics such as educational metadata, geographic information systems, and next-generation Internet technologies. Makoto Nagao, President of Kyoto University and President of the Japan Library Association, presented a keynote on metadata for multimedia information.

A call for papers was issued in Spring 2000 and active preparations began in July. Papers were solicited not only on novel research results but also on implementation experience and "good practice". Fifty papers were received from authors in twenty countries from four continents. Each paper was assigned at least four reviewers. DC-2001 accepted 29 papers for oral presentation and 12 papers for poster presentation. These accepted papers, plus a few invited papers, were presented in paper sessions. The conference proceedings were published both in printed and electronic forms.

The conference organizer arranged with the Journal of Digital Information (JoDI), a peer-reviewed online-only academic journal, to publish a selection of papers from DC-2001. Starting with all papers submitted

to DC-2001 as regular research papers and accepted by DC-2001 for oral presentation, JoDI submitted the papers to a second parallel review process; in some cases, conference papers were revised for JoDI in response to reviewer suggestions [3].

The local organizers recognized from a very early stage of planning that tutorials would be a very important part of the event for attendees, many of whom would be relatively new to Dublin Core and to metadata generally. Tutorials covered basic issues of metadata and Dublin Core for beginners and potential practitioners:

1. Introduction to Dublin Core by Erik Jul
2. Introduction to Resource Description by Erik Jul
3. Introduction to Application Profiles by Andy Powell and Rachel Heery

The local organizers, together with DCMI, provided some travel support, especially for attendees from developing countries. In the end, there were roughly 300 registrations including 100 from outside Japan. Table 1 summarizes participation by country.

Table 1. Summary Table of Participation by Country

Australia	Canada	Denmark	Estonia	Finland
France	Germany	Hong Kong	India	Indonesia
Italy	Japan	Korea	Luxemburg	Malaysia
New Zealand	Philippines	Portugal	Russia	Singapore
Spain	Sweden	Switzerland	Taiwan	Thailand
United Kingdom	USA	Vietnam		

2.2 Highlights of the Workshop Track

The Workshop track at DC-2002 included meetings by a variety of working groups with ongoing work plans, including working groups on "agents", educational resources, government information, and libraries. These face-to-face meetings helped clarify problems and stimulate progress in the working groups, in particular on developing formal proposals to the DCMI Usage Board. Discussions in the Agent Working Group focused on on an Agent Linking proposal, providing direction for linking structured metadata about people and organizations into metadata concerning the resources for which such agents are responsible.

At the Tokyo meeting, the Citation Working Group identified several areas requiring effort: to propose a citation qualifier for dc:identifier; to propose a means of encoding a journal article bibliographic citation record within a parsable text string; to identify a list of standard identifiers applicable to bibliographic citation; and to propose a means of encoding a journal article bibliographic citation record in XML and RDF. The working group on the element decided that development of a DCMI sub-type list would be impractical; rather, that the task of the WG should be to advise domain-specific groups on identifying their own lists of types by developing best-practice guidelines. An outline for "Guidance for Domains and Organizations Developing Type Vocabularies for use with Dublin Core" was produced.

An important track at the workshop event was a series of meetings of the DCMI Usage Board, described in more detail below. This was the first occasion for the newly constituted Usage Board to meet at an all-DCMI workshop, and several discussions, both formal meetings and informal gatherings, provided an opportunity to exchange views with working groups about emerging requirements, architectural issues, and the work-flow of proposals submitted for new terms or domain-specific application profiles.

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2.3 Conference Track

Table 2 summarizes the conference program, which covered a wide range from technical issues of metadata design to metadata applications in particular domains; the Appendix includes a full list of paper titles. In addition to the regular paper sessions there were several special sessions with (mostly) invited presentations on important areas adjacent to Dublin Core: educational metadata, geographical information systems and geospatial information, next-generation Internet technologies, Open Archives Initiative, and government information.

DC-2001 solicited not only research papers but also "good practice reports". In the Call for Papers, we had two submission categories – a "long-paper" category for regular research reports and a short-paper category for short reports on research or implementations that did not fall under the former. About half of the submissions were "long". However, several of the papers submitted to the short paper category achieved particular high scores from reviewers. Those high-score papers included surveys and activity reports on specific metadata domains – types of papers that are routinely rejected by more "innovation-oriented" academic conferences even though they may be informative for conference participants. The program co-chairs considered that these types of papers are crucial for the metadata community and decided to loosen the page limit in order to allow authors to describe their subjects in sufficient detail. The conference proceedings in electronic form is published by NII and accessible on the Web [4]

Table 2. Session Titles

Paper Session 1: Queries
Paper Session 2: Metadata for Learners
Paper Session 3: Domain Profiles I
Paper Session 4: Complexity and Granularity
Paper Session 5: Models
Paper Session 6: Domain Profiles II
Paper Session 7: Tools
Paper Session 8: Application Architectures
Special Session 1: Metadata in Education
Special Session 2: Government Information
Special Session 3: Open Archives Initiative (Panel)
Special Session 4: Next Generation Internet
Special Session 5: Geographic Information Systems

2.4 The DCMI Advisory Board at DC-2001.

The annual event provides an opportunity for the DCMI Advisory Board (formerly the Advisory Committee) to meet and discuss operational matters. The Dublin Core Advisory Board (DC-AB) is comprised of all chairs of DCMI Working Groups and Interest Groups as well as additional invited experts. The Advisory Board gives advice to the DCMI Directorate on all technical and strategic issues that occur during the operation of DCMI. It has a dual role in DCMI: internally, to assist in and advise on the developments that take place within DCMI, and externally, to liaise with the stakeholder community and other global metadata initiatives. It has an additional important role in reviewing charters and activities of Working and Interest Groups with specific emphasis on recognizing and signaling potential conflicts between activities, suggesting specific coordination between Working and Interest Groups, and proposing specific contacts with individuals, groups or organizations outside DCMI.

3. DCMI Activities since DC-2001 [5]

3.1 Working Groups

Working groups drive the development of Dublin Core by developing specifications, proposing metadata semantics, or clarifying requirements in particular domains. New and existing working groups are approved annually by the Advisory Board. At the Board meeting in Tokyo, working-group charters were approved to continue work on administrative metadata, the description of agents, architectural issues, citation methods, collection description, the education, government, and library domains, a Web-based registry, formal standardization, metadata tools, the type element, and a user guide.

Three new interest groups were approved for the topics of accessibility, environmental information, and localization-and-internationalization (LI). LI-IG is a renewal of the former Multiple Languages interest group, with a focus on addressing issues of expressing DC metadata in multiple languages and providing guidance on local issues for deploying Dublin Core. The Accessibility interest group provides a forum to discuss the accessibility of the products of DCMI itself, and to consider the relation between accessibility descriptions and Dublin Core descriptions. The Environment Interest Group is a forum for individuals and organizations involved in implementing Dublin Core in the environmental domain, with the objective to establish representation of the domain in DCMI and to promote interoperability within the domain through the use of Dublin Core. It will collect information on usage of the Dublin Core in the domain, work on establishing guidelines and develop a domain-specific application profile.

3.2 Usage Board

The Usage Board was chartered in February 2001 to act as an editorial review committee for maintaining the growing set of Dublin Core metadata terms over time [6]. Just as dictionaries have editorial groups to review and revise definitions and usage notes on the basis of empirical study and feedback, the DCMI Usage Board undertakes to clarify or update the definitions of existing terms, evaluates proposals for new terms submitted by working groups, and reviews "application profiles" that extend Dublin Core for use in particular areas such as educational resources or government information.

The idea of a Usage Board emerged from experience in the early years of the Dublin Core Metadata Initiative. After the two first "Recommendations" were approved by the full Advisory Committee – Dublin Core Metadata Element Set versions 1.0 and 1.1, a Usage Committee was formed in 1999 as a subset of the Advisory Committee to approve a first set of qualifiers in early 2000. Managing the discussion and balloting of 69 proposals for new terms among 25 members proved to be difficult, but the process helped clarify basic principles and suggested ways to improve procedures.

After the qualifier vote, DCMI was better prepared to formulate formal procedures and principles to guide the future processing of such proposals. The newly constituted Usage Board met for the first time in May 2001 with just seven members and has since expanded to eight. The Board evaluates proposals from working groups for their conformance to the principles and architecture of Dublin Core. This Dublin Core "grammar" includes a typology of Elements, Element Refinements, and Encoding Schemes along with some general principles, such as the axiom that the values of element refinements should be usable as values of the element refined. A "namespace policy" defines limits and guidelines for allowing the metadata terms maintained by DCMI to evolve in response to actual usage while ensuring the persistence of coherent semantics over time.

The Usage Board has met twice in 2001 and once in 2002, defining formal review processes, developing procedures for registering externally maintained encoding schemes, and approving several proposals for new terms. Proposals which are not approved are sent back to working groups with suggestions on how

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they might be revised and resubmitted. The process has the feel of the review board for a scientific journal or conference, where reviewers may actively engage with authors for the common purpose of improving the end results.

The underlying motivation for the Usage Board is to provide a framework in which metadata requirements that "bubble up" in particular implementation contexts can be shared in wider circles and eventually be incorporated into a standard where they will be declared in a persistent way and maintained in accordance with known principles. This reflects the conviction that metadata usage, analogously to language usage in general, can only partially be steered from the top down, on the model of traditional standardization activity. In the DCMI model, the art of standards development lies in striking balances between innovation from below and qualified review from above or between domain-specific specificity and cross-domain applicability. The Usage Board process aims to guide the formulation and formalization of community standards for particular domains that integrate well into broader frameworks for interoperability. Members of the Usage Board are:

Thomas Baker, Fraunhofer-Gesellschaft, Germany (chair)
Rebecca Guenther, Library of Congress, USA
Diane Hillmann, Cornell University, USA
Traugott Koch, NetLab, Sweden
Haruki Nagata, ULIS, Japan
Andy Powell, UKOLN, UK
Roland Schwaenzl, University of Osnabrueck, Germany
Stuart Sutton, University of Washington, USA

3.3 Board of Trustees

One of the important transitions for DCMI in the past year has been the installation of a Board of Trustees. These trustees were chosen to provide strategic leadership and support to the organization, and were selected for their leadership and professional abilities in the public, private, and educational sectors. Board members come from six countries on four continents:

Denise Bedford, Thesaurus Manager and Senior Information Officer, World Bank Group (Washington, D.C., U.S.A.)
Joseph Busch, Knowledge Management Consultant
Michael Crandall, Technology Manager, Libraries and Public Access to Information Program, Bill & Melinda Gates Foundation (Seattle, Washington, U.S.A.)
Lorcan Dempsey, Vice President, OCLC Research (Dublin, Ohio, U.S.A.)
Juha Hakala, Development director, Helsinki University Library - The National Library of Finland (Helsinki, Finland)
Nathalie Leroy, Chief, Information Processing Section, Library, United Nations Office at Geneva (Switzerland)
Neil Mclean, Director, IMS Australia, Macquarie University (Sydney, Australia)
Nigel Oxbrow, Chief Executive, TFPL Ltd. (London, U.K.), and
Shigeo Sugimoto, Professor, University of Library and Information Science (Tsukuba, Japan).

The Board held its first face-to-face meeting in Lund, Sweden in April of 2002, at which time discussions were held to formulate organizational and business plans for DCMI.

4. DCMI and other metadata initiatives

4.1. DCMI and IEEE-LOM

At DC-8 in Ottawa in October 2000, DCMI and representatives of the IEEE-Learning Object Metadata (LOM) working group concluded a memorandum of understanding indicating areas of possible convergence on principles and encoding approaches that have the potential to increase interoperability between the two communities [7]. A subsequent meeting in Ottawa in August 2001 identified specific work items, which are now underway. A prominent deliverable from this activity is the recently published "Metadata Principles and Practicalities," an expression of agreement among leaders in the Dublin Core community and the e-learning community concerning basic principles of metadata [8]. This consensus should value to metadata practitioners in these respective communities as well as among metadata practitioners in general.

On the basis of the common principles identified, practical guidance will be developed, including a set of examples that illustrate how metadata should be generated in a given application profile involving both DCMI and LOM metadata as well as examples of application profiles in the form of a machine-readable compound schema. Further issues to be addressed are the development and maintenance of registries and an assessment of the degree of semantic drift that may have developed in the LOM interpretation of DCMI terms.

4.2. Dublin Core and Open Archives Initiative (OAI) [9]

The Dublin Core Metadata Initiative and the Open Archives Initiative are actively cooperating on metadata issues. Unqualified DC metadata is the default metadata set used in the OAI Protocol for Metadata Harvesting for the purposes of promoting cross-domain interoperability. Other domain-specific sets are encouraged as well, as envisaged in the modular metadata framework that both communities have been striving for. The OAI-DC schema has been developed for use with the OAI Protocol, and has been discussed at length in the DC-Architecture working group. It is expected that the schema will be of use for other applications as well, and will be hosted on the DCMI Website and maintained by representatives of both groups. This development is an important landmark in the development of Web-based metadata services, reflecting as it does the convergence of community consensus and the development of enabling infrastructure to support that consensus. The schema is available at http://dublincore.org/schemas/xmls/simpledc20020312.xsd.

4.3. W3C Semantic Web Activity

The launch of the Semantic Web activity by the W3C recognizes the increasing importance of supporting the infrastructure for defining, registering, and referencing structured vocabularies and ontologies on the Web [10]. The Dublin Core is an important part of this infrastructure, and the DCMI community has played a major role in laying the foundations for this work. A joint project between DCMI staff and W3C staff now under development will help illustrate the value of combining technologies such as the Resource Description Framework of the W3C with the Dublin Core to advance semantic interoperability on the Web.

The Internet Commons is all the more effective, the better information resources can be discovered, retrieved, and rendered. The linking idiom of the Web solves an important dimension of this problem, but cross-disciplinary metadata standards are required to increase semantic interoperability across languages, disciplines, and sectors. The Dublin Core addresses this need for general information resources, but namespace branding and the need for extensions to basic discovery metadata often make it desirable to manage metadata namespaces locally.

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RDF schemas allow the declaration of metadata elements in ways that allow retaining control and branding of their local DC-derived namespaces declaring elements as sub-properties of a DC element where appropriate. Of course, local datasets may include elements not related to Dublin Core per se, but by using RDF schemas to declare relationships that are obvious, metadata designers can satisfy the need for local management and element set branding while still ensuring that their data will be visible in the larger context of the Internet Commons.

The joint project between DCMI and W3C staff will unify access to a substantial amount of data from different sectors in different countries using RDF schema declarations as described above. Participants will be recruited from the government sector, museums, business, trans-governmental organizations, and education. The resulting database will comprise a testbed accessible to researchers and designers to demonstrate and experiment with an operational cross-disciplinary store. It will provide a tutorial by example on a schema-based approach to enhancing cross-domain interoperability.

5. Concluding Remarks

DC-2001 was the first workshop event of the Dublin Core Metadata Initiative to include a full conference, with paper presentations and tutorials. Despite the uncertainties of an international event held soon after September 11th, DC-2001 attracted an excellent range of international and domestic participants. Most of the domestic participants were newcomers to DCMI events. DC-2001 provided an important model for continuing the shift in emphasis from basic standardization to evaluation and exchange of implementation experience in the broader metadata world.

References

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[6] DCMI Usage Board, http://dublincore.org/usage/
[7] Memorandum of Understanding between the Dublin Core Metadata Initiative and IEEE Learning Technology Standards Committee, http://dublincore.org/documents/2000/12/06/dcmi-ieee-mou/
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[9] OAI Protocol for Metadata Harvesting, http://www.openarchives.org/OAI/openarchivesprotocol.htm.
[10] W3C Semantic Web, http://www.w3.org/2001/sw/

Appendix: Table of Contents from Proceedings of DC-2001

Paper Session 1: Queries

- RDF Declarative Description (RDD): A Language for Metadata, Chutiporn Anutariya, Vilas Wuwongse (Asian Institute of Technology), Kiyoshi Akama (Hokkaido University) and Ekawit Nantajeewarawat (Sirindhorn International Institute of Technology)
- Multilingual Access to Dublin Core Metadata of ULIS Library, Danyang Wen, Tetsuo Sakaguchi, Shigeo Sugimoto and Koichi Tabata (University of Library and Information Science)
- MetaXPath, Curtis E. Dyreson (Washington State University), Michael H. Bohlen and Christian S. Jensen (Aalborg University)

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Paper Session 2: Metadata for Learners

- The Dublin Core and Metadata for Educational Resources, Stuart A. Sutton (University of Washington) and Jon Mason (EdNA)
- A Framework for the Multi-modal Description of Learning Objects, Eva Heinrich and Jisong Chen (Massey University)
- Author-generated Dublin Core Metadata for Web Resources: A Baseline Study in an Organization, Jane Greenberg, Maria Cristina Pattuelli, Bijan Parsia (University of North Carolina at Chapel Hill) and W. Davenport Robertson (National Institute of Environmental Health Sciences)

Paper Session 3: Domain Profiles I

- Management of Environmental Information in the European Information and Observation Network (EIONET), Matthias Menger, Thomas Pick (European Topic Centre on Catalogue of Data Sources), Hannu Saarenmaa (European Environment Agency) and Kirsti Lounamaa (TietoEnator)
- Collaborative Cataloguing of Moving Images and New Media Art Works, Simon Pockley and Emily Cavanagh (The Australian Centre for the Moving Image)
- Metadata Mapping and Application Profiles. Approaches to providing the Cross-searching of Heterogeneous Resources in the EU Project Renardus, Heike Neuroth (Lower Saxony State and University Library Gottingen) and Traugott Koch (Lund University)

Paper Session 4: Complexity and Granularity

- A metadata framework to support scholarly communication, Thomas Krichel (Long Island University) and Simeon M. Warner (Los Alamos National Laboratory)
- Mixing and Mapping Metadata to Provide Integrated Access to Digital Library Collections: An Activity Report, Karen Calhoun, Tom Turner, Meryl Brodsky, George Kozak, Marty Kurth, Fred Muratori, David Ruddy and Sarah Young (Cornell University)
- A Metadata Approach to Digital Preservation, Maria Luisa Calanag, Shigeo Sugimoto and Koichi Tabata (University of Library and Information Science)

Paper Session 5: Models

- What Terms Does Your Metadata Use? Application Profiles as Machine-Understandable Narratives, Thomas Baker (Fraunhofer-Gesellschaft), Makx Dekkers (Dublin Core Metadata Initiative), Rachel Heery, Manjula Patel (UK Office for Library and Information Networking) and Gauri Salokhe (Fraunhofer-Gesellschaft)
- The ABC Ontology and Model, Carl Lagoze (Cornell University) and Jane Hunter (DSTC Pty,Ltd.)
- A Metadata Kernel for Electronic Permanence, John A. Kunze (University of California)

Paper Session 6: Domain Profiles II

- A Dublin Core Application Profile in the Agricultural Domain, Irene Onyancha, Johannes Keizer and Stephen Katz (Food and Agriculture Organization of the United Nations)
- Design and Implementation of the National Institute of Environmental Health Sciences Dublin Core Metadata Schema, W. Davenport Robertson, Ellen M. Leadem (National Institute of Environmental Health Sciences), Jed Dube (National Institute of Environmental Health Sciences / OAO Corp.) and Jane Greenberg (University of North Carolina at Chapel Hill)
- Metadata Development for Digital Libraries and Museums - Taiwan's Experience, Hsueh-hua Chen (National Taiwan University) and Chao-chen Chen (National Taiwan Normal University)

Paper Session 7: Tools

- A Multilingual Metadata Schema Registry Based on RDF Schema, Mitsuharu Nagamori (University of Library and Information Science), Thomas Baker (GMD German National Research Center for Information Technology), Tetsuo Sakaguchi, Shigeo Sugimoto and Koichi Tabata (University of Library and Information Science)
- Personalizing Information Spaces: A Metadata Based Approach, David L. Hicks (Aalborg University Esbjerg) and Klaus Tochtermann (Know-Center)
- Evaluation and Design Issues of Nordic DC Metadata Creation Tool, Preben Hansen (Swedish Institute of Computer Science)

Paper Session 8: Application Architectures

- zetoc: a Dublin Core Based Current Awareness Service, Ann Apps and Ross MacIntyre (University of Manchester)
- Metia - A Generalized Metadata Driven Framework for the Management and Distribution of Electronic Media, Patrick Stickler (Nokia Research Center)
- Qualified Dublin Core using RDF for Sci-Tech Journal Articles, Thomas G. Habing, Timothy W. Cole and William H. Mischo (University of Illinois at Urbana-Champaign)
- Metadata Interoperability and Meta-search on the Web, Enric Peig, Jaime Delgado and Ismael Perez (Universitat Pompeu Fabra)

Special Session 1: Metadata in Education

- Metadata for Education, Jon Mason (EdNA)
- What's LOM?, Yasuhiro Okui (Nihon Unitec Co.,Ltd)
- Effective Retrieval of Educational Resources by Using Learning Object Metadata for K-12 Schools in Japan, Masanori Shinohara, Mayumi Okamoto (NTT-East Co.), Yasuhiro Okui (Nihon Unitec Co.) and Takamitsu Tanaka (NTT Learning Systems Co.)
- The Meaning of LOM and LOM Authoring Tool on HRD, Kenji Hirata (The Sanno Institute of Management), Yoshiyuki Takaoka, Mamoru Ohta (Toko Seiki Co.) and Mitsuru Ikeda (Osaka University)

Special Session 2: Government Information

- Metadata in the UK, Maewyn Cumming (Office of the e-Envoy)
- The use of Metadata in Denmark, Leif Andresen (Danish National Library Authority)
- Between a Rock and a Hard Place: Dealing With NZGLS Development Issues, John Roberts (Archives New Zealand)
- Use of Dublin Core in a Portal Environment, Nancy Brodie (Treasury Board of Canada Secretariat)

Special Session 3: Open Archives Initiative

- Panel on Open Archives Initiative, Thomas Krichel (Palmer School), Rachel Heery and Andy Powell (UKOLN, UK)

Special Session 4: Next Generation Internet

- IPv6: Addressing the Future. Fred Baker (Cisco Systems, Inc.)
- What's going on about IPv6 in Japan?, Kazuhiko Yamamoto
- QoS Applications. Shinji Shimojo
- Emergency Communications System. Hiroyuki Ohno

Special Session 5: Geographic Information Systems

- CSIS Clearinghouse for Academic Research Communities in Japan, Masatoshi Arikawa and Takeshi Sagara (The University of Tokyo)
- Geographic data clearinghouse activity in GSI, Noriyuki Takakuwa (Geographical Survey Institute, Ministry of Land, Infrastructure and Transport)
- Japan Metadata Profile (JMP) for Geographic Information Clearinghouses, Morishige Ota (Kokusai Kogyo Co.,Ltd.)
- Constructing Digital Earth with Geo-Informatics, Hiromichi Fukui (Keio University)

Posters

- Interoperable Summary Description Model Using Dublin Core, Do-Nyun Kim and Young-Won Song (LG Electronics)
- A Metadata Case Study for the FRBR Model Based on Chinese Painting and Calligraphy at the National Palace Museum in Taipei, Simon C. Lin, Ya-ning Chen, Shu-jiun Chen, Yi-ting Chang (Academia Sinica) and Shai-lan Hu (National Palace Museum)
- Adopting DC Metadata for Union Serial System of KERIS: It's Design and Implementation, Yong Soon Kim, Ji Won Lee and Hyeong Yong Park (Korea Education & Research Information Service)
- A Metadata Application Profile for the German Virtual Library. Carola Wessel and Heike Neuroth (Goettingen State and University Library), Design and Implementation of Metadata for Indian Fungi (Heterobasidiomycetes): Lessons From Library and Information Science Field. Shubhada Nagarkar

(University of Pune), Kanchanganga Gandhe (Modern College) and Geoffrey Bowker (University of California, San Diego)

- Metadata for Evidence Based Medicine Resources, Yukiko Sakai (Keio University)
- A report on Dublin Core based research information service on mathematics, Kazuhiko Asou (The University of Tokyo), Takako Nakahara (Kyoto University) and Takao Namiki (Hokkaido University)
- Educational Information in the Web: Discussing the Metadata Requirements for a Web Service Guiding Citizens' Education, Soile Hirvasniemi and Kai Oorni (University of Oulu)
- The San Fernando Valley History Digital Project: a Collaborative Digital Project. Between Local Historical Societies and a University Library
- Mary S. Woodley (University of California, Northridge), Necessities on a Descriptive Level for Reusing Metadata Descriptions, Kazushi Ohya (Maruzen Co.,ltd.)
- Priority Control Mechanism managed by Metadata, Rei S. Atarashi (Communications Research Laboratory / Nara Institute of Science and Technology), Hiroyuki Ohno (Communications Research Laboratory), Makoto Niimi (Yokogawa Electric Corporation/Communications Research Laboratory) and Kunihiro Chihara (Nara Institute of Science and Technology)
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